

Lewis County Group B Design Workbook



**This workbook supports the Lewis County
Group B Water System Guidelines &
Lewis County Code 8.55
Effective January 1, 2014**



Lewis County Public Health and Social Services

INTRODUCTION

The Lewis County Group B Design Workbook, (workbook), is a revision of the Washington State Department of Health (DOH) publication *Group B Design Workbook*, PUB331-468. It is consistent with Lewis County Code 8.55 (LCC8.55) Group B Public Water Systems. LCC8.55 is the Lewis County (county) regulation that adopts a regulatory framework for supporting oversight and monitoring of Group B water systems and establishes development standards to assure safe reliable water supplies. Although LCC8.55 is predominantly consistent with chapter 246-291WAC there are significant differences particularly in reference to; one and two party water supplies, primary and secondary treatment, financial viability, waivers, and monitoring. The intent of this workbook is to help engineers prepare a complete Lewis County Project submittal.

Preparation of this workbook will satisfy the design and planning requirements for a new or expanding Group B water system (LCC8.55.100 and LCC8.55.130 respectively). However as a professional engineer, you are not required to utilize the Workbook, or the format, you may submit your design in an alternate format of your choosing. However, you must submit all the information referenced and required by LCC8.55.

Before sending your completed workbook to Lewis County Public Health and Social Services (county), make copies of all plans, design drawings, worksheets, equipment information, operations and maintenance manuals, legal documents, and forms. Keep this information with your other project documents because it will help you and others successfully manage and operate your new water system.

Regulations

We suggest you become familiar with Lewis County Code 8.55(LCC8.55) Group B Public Water Systems before you start your design. LCC8.55 was adopted in December of 2013 and became effective January 1, 2014. The code is online at <http://lewiscountywa.gov/environmental-health/drinking-water-program>

Group B Water System Design Guidelines

Use this workbook with the Lewis County Group B Water System Design Guidelines. The guidelines are online at <http://lewiscountywa.gov/environmental-health/drinking-water-program>

Even if you have a lot of experience designing small systems, we recommend you read the guidelines before starting your design. **There are significant changes in water demand, well pumping, water quality testing, and water rights.** The Guidelines and the Workbook were created to support your goal of preparing a complete submittal that reflects sound water system design practices and established principles of public health protection. They address the following questions:

- When is a one or two party well required to meet Group B requirements?
- Which water quality tests must I submit and how must they be taken?

- What do I do if the source exceeds a primary or secondary contaminant mcl?
- What type and how long must the pump test be run on my well?
- How do Washington's water rights laws affect my design?
- How big an easement should I have for my pipelines?
- What information must I include on the title of customers' properties?

Certain one and two-connection water systems are regulated by the Lewis County Code but are not required to meet a full Group B water system approval. Prior to submitting your Group B design workbook, see Section 2.1 of the *Guidelines* and LCC 8.55.020 for your project requirements.

Fees Charged for Workbook Design Reviews

A completed workbook addresses the planning, design report, and construction documents required by LCC 8.55.100 and 8.55.130.

- Lewis County Public Health and Social Services (department) is the reviewing authority. Fees will be charged for the design review. The current fee schedule is online at <http://lewiscountywa.gov/publichealth/2014-fee-schedule>
- Well site inspections are a separate fee. The current fee schedule is online at <http://lewiscountywa.gov/publichealth/2014-fee-schedule>
- Additional fees may be charged for treatment and design revisions.



Online Group B Resources

The county has developed materials, forms and applications for your project that can be found online at;

<http://lewiscountywa.gov/environmental-health/drinking-water-program>

The Washington State Department of Health (DOH) has also developed helpful resources that are online. You can view their Group B resources at

<http://www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/WaterSystemAssistance/GroupB/GroupBResources.aspx>

Lewis County Public Health and Social Services Contacts

All Group B water systems must be designed by a professional engineer (LCC8.55.100(3)).

Before beginning your Group B design we strongly recommend that you contact the county with questions or concerns. Table 1 contains contact information

Table 1

Lewis County Public Health and Social Services

If you have questions about this workbook or the *Lewis County Group B Water System Design Guidelines*, call Lewis County at the following contacts. You can get additional contact information for other departments on the Lewis County website at: <http://lewiscountywa.gov/>

Table 1.1
Lewis County Public Health and Social Services

Director
Danette York, M.P.H., C.P.H. Phone: 360-740-2774 Fax: 360-740-1145 TDD Relay: 360-740-1480
Environmental Health Supervisor
William Teitzel Email; William.Teitzel@Lewiscountywa.gov Phone: 360-740-1261 Fax: 360-740-1245 TDD Relay: 360-740-1480
Senior Environmental Health Specialist – Water Program
Susan Kennedy, RS Email: Sue.Kennedy@Lewiscountywa.gov Phone: 360-740-2691 Fax: 360-740-1245 TDD Relay: 360-740-1480 Physical: 2025 NE Kresky Ave Chehalis, WA 98532

Group B Planning and Design Submittal Checklist

CHECKLIST FOR A NEW OR EXPANDING GROUP B WATER SYSTEM

Planning and Design Submittal Element	Group B Design Guidelines Section	Yes, Included	No, Not Applicable
Completed submittal checklist for a new or expanding Group B system			
Completed project approval application form	Section 2.2		
Property title notice	Section 2.6		
Service area map	Section 2.3		
Demonstrate compliance with SMA requirement <u>Applies to new systems only.</u>	Section 2.5		
Demonstrate compliance with PWS Coordination Act	Section 2.4		
Completed Water Facilities Inventory (WFI)*	Section 2.8		
Water right permit or other needed Dept. of Ecology approval	Section 3.0		
Well log	Section 4.1		
Well pump test report	Section 4.1		
Well water quality sampling results	Section 4.2		
Documentation of well site approval	Section 4.3		
Well sanitary control area protective covenants	Section 2.7 and 4.3		
Intertie agreement	Section 4.4		
Well and pump house detailed drawings and specifications	Section 5.2 and 5.3		
Distribution system detailed drawing and specifications	Section 6.10		
Storage tank sizing, detailed drawings, and specifications	Section 7.6		
Booster pump sizing, detailed drawings, and specifications	Section 8.0		
Establish viability to treat for a primary mcl	Section 9.0		
Primary contaminant treatment design	Chapter 9		
Secondary treatment design	Chapter 10		
Completed <i>Group B Design Report Workbook</i>			

* Completing a *Water Facilities Inventory Form* will expedite the review process. The department cannot approve a Group B design workbook for a new or expanding Group B water system without receiving information contained on a completed WFI.

GROUP B Design Report Workbook

1.0 Engineer and Owner

Failure to complete all applicable sections of this workbook will result in denial of your application or delay in its approval. Please print all information.

1.1 Water System Engineer

Professional Engineer, apply seal here.

Workbook prepared by _____

Mailing Address _____

Company Name _____

Day Phone _____

1.2 Water System Owner

Owner's Name _____

Owner's Mailing Address _____

Day Phone _____

Owners Statement of Accuracy and Responsibility:

I , the undersigned , do hereby attest that as the owner of this water system I am responsible for any maintenance or repairs involved in the continuing operation of this system and the accuracy of this project submittal.

Signature: _____

Date _____

1.3

Owner's Representative Signature _____

Date _____

2.0 Basic Water System Information

2.1 Water system name and location

System Name _____

Water System Location _____
(Tax Parcel and physical address)

Well site inspection # _____

Public Water System ID# _____
(Applies only to existing systems seeking approval to expand)

2.2 Basic information

You **must** submit the following with this workbook:

- Completed Group B planning and design submittal checklist
- Completed project approval application form
The form is online at <http://lewiscountywa.gov/environmental-health/drinking-water-program>
- Property title notice (the notice you intend to record on the title for each property served, see *Group B Water System Design Guidelines* Section 2.6) System will not be approved until copies of the filed notice are submitted to the department.
- Service area map, including parcel numbers.
- Demonstrated compliance with Satellite Management Agency requirement
See *Lewis County Group B Water System Design Guidelines* Section 2.5.
- Demonstrated compliance with Public Water System Coordination Act
See *Lewis County Group B Water System Design Guidelines* Section 2.4.
- If the system has a reservoir or treatment a comprehensive Operation and Maintenance Plan is required.

We recommend you include a completed *Water Facilities Inventory Form*. See *Group B Water System Design Guidelines* Appendix E.

2.3 Connections and Population

See the requirements for establishing the design service population for each dwelling unit in LCC8.55.150(2). See Section 2.0 of the *Lewis County Group B Water System Design Guidelines* for expectations on counting accessory dwelling units as separate connections.

Connections		Service Population	
Dwelling units	Nonresidential	Residential	Nonresidential

Use the space below to describe the basis for estimating your residential and nonresidential service population.

3.0 Estimating Water Demands

3.1 Complete Worksheet 3-1

Summary of Peak Hourly Demand (PHD) and Maximum Daily Demand (MDD) Summary

Worksheet 3-1

Line	Group B Design Guidelines Section	Description	Value
A	3.1.1, and 3.3	Total residential MDD, gallons per day	
B	3.1.2, and 3.3	Total residential PHD, gallons per minute	
C	3.2.1, and 3.3	Total non-residential MDD, gallons per day	
D	3.2.2, and 3.3	Total non-residential PHD, gallons per minute	
F-1	3.4	Fire suppression flow required (if any), gpm	
F-2	3.4	Fire suppression flow duration, minutes	

Total area intended for irrigation: _____ square feet or acres

Total system MDD (Lines A+C): _____ gallons per day

Total system PHD (Lines B+D+F1): _____ gallons per minute

Is a **water right permit** or other written Dept. of Ecology water resource approval required? See Section 3.0 of the *Lewis County Group B Water System Design Guidelines*.

_____Yes _____No

If “Yes,” enclose a copy of the water right permit or other written approval from the Department of Ecology.

Use the space below to show your calculations of estimated MDD and PHD:

4.0 Source of Supply

4.1 Well information

If a well will supply water to your system, you must attach the following to your design submittal:

- Well log
- Pump test report (See Section 4.1 of the *Lewis County Group B Water System Design Guidelines*)
- Water quality sampling results (See Section 4.2 of the *Group B Water System Design Guidelines* and LCC8.55.140).
- Pre-design approval for treatment of a Primary MCL if required.
- Well site inspection report prepared by DOH or Lewis County
- Well sanitary control area protective covenants (Attach a copy of the actual protective covenants filed with the County Auditor for each public drinking water well. See Sections 2.7 and 4.3 of the *Lewis County Group B Water System Design Guidelines*.)
- Low yield well water supply contingency plan, if required. (See Section 4.1 of the *Lewis County Group B Water System Design Guidelines*.)



4.2 Wellhead Protection Inventory

Please indicate whether any of the following are present within 600 feet of your well.

Potential Water Quality Threat	Yes	No	Unknown
Likely pesticide application			
Storm water injection wells			
Other injection wells			
Abandoned groundwater wells			
Landfills, dumps, disposal areas			
Known hazardous materials site			
Another water system with known water quality problems			
Residential development greater than one house per acre			
Residential septic tanks			
Underground storage tanks			
Sewer lines			
Storm water disposal areas			
Surface water – If yes, specify distance from well site: _____ feet			

Use this space to provide more detail of any water quality threat located within 600 feet of your well:

4.2 Intertie information

If an intertie will supply your system, you must attach a copy of your intertie agreement, and service capacity and hydraulic analyses of the wholesale system. For details about the minimum scope of an intertie agreement, see LCC8.55120(2) and (3).

5.0 Well Pump, Bladder Tanks, and Pump House

5.1 Piping Schematic

Draw a schematic of the piping system below. Begin with the well, continue to the pump house, and on to the distribution system. Include each branch line in the distribution system, and label each branch line junction. These junction points will be referenced in Worksheet 5-1.

(See Example 5-1 in Section 5.0 of the *Lewis County Group B Water System Design Guidelines*.)



5.2 Complete Worksheet 5-1 (See Example 5-1 in Section 5.0 of the *Lewis County Group B Water System Design Guidelines*.)

Total Dynamic Head Calculation												
Friction Head Calculation								Static Head Calculation, Assume top of well casing elevation is 0 ft.			Min. Pressure Head, ft	Min. Total Dynamic Head, ft
Pipe Segment	From	To	Pump or Flow Rate, gpm	Pipe Size, inches	Friction Loss per 100 ft	Pipeline Length, ft	Pipe Segment Friction Loss, ft	Top of well casing to water while pumping, ft	Ground Elev. at “to”	Elevation difference, ft		
1	Well pump	Top of well casing									69	
2	Top of well casing										69	
3											69	
4											69	
5											69	
6											69	
7											69	
8											69	
9											69	

1. With a simple system consisting of only a well pump and bladder tanks, the well pump is the only pump in the system. Without a storage tank, the well pump must generate enough flow and pressure to supply at least the PHD, and to provide at least 30 psi to each customer connected to the distribution system during PHD conditions.
2. For the segment that includes the well house, add 10 feet of friction loss to account for losses related to fittings and valves. If you intend to use a CSV, add additional friction loss per manufacturer’s data (See Section 5.0 of the *Group B Water System Design Guidelines*).
3. Total the “pipe segment friction loss” for each pipe segment + “elevation difference” + “minimum pressure head” values. The highest total dynamic head (TDH) is the minimum pressure, expressed in feet of head that the well pump must generate while pumping the peak hourly demand. You may wish to select a pump with a TDH greater than the required minimum.

5.3 Summary of Well Pump Selection

Cycle Stop Valve (CSV) incorporated in design: _____ Yes _____ No

Variable frequency drive well pump(s) incorporated in design: _____ Yes _____ No

<u>Pump Design Parameter</u>	<u>At well pump “on”:</u>	<u>At well pump “off”:</u>	<u>Comment</u>
Pressure switch settings or Reservoir level control	_____ psi _____ ft	_____ psi _____ ft	If well pumps to bladder tanks If well pumps to atmospheric reservoir
Discharge rate	_____ gpm	_____ gpm	
Total Dynamic Head	_____ feet	_____ feet	

Well pump setting (depth) below top of well casing: _____ feet

Attach well pump catalog information with your design submittal:

- Pump curve (or table showing discharge head and corresponding discharge flow)
- Identify the pump “on” and pump “off” operating points on the pump curve
- Pump manufacturer and pump model number
- Pump horse power

5.4 Bladder Tank Selection (for well pump or booster pump)

Follow the design guidance in Section 5.1 of the *Group B Water System Design Guidelines* for bladder tank selection. If the design includes a cycle stop valve, see the design guidelines Appendix G.

Summarize the bladder tank selection:

Size of bladder tanks _____ gallons
Number of tanks _____ tanks
Pre-charged pressure _____ psi

Use the space below to show your calculations (Equation 5-2) for selecting bladder tanks:

5.5 Well and pump house detailed drawings and specifications

Attach a copy of the well and pump house detailed drawings and specifications. The minimum scope of this information is in Sections 5.2 and 5.3 of the *Lewis County Group B Water System Design Guidelines*.

6.0 Piping and Distribution System

6.1 Summary of pipe design

Distribution system pipe size and material specified:

(For example, *1½ to 3-inch ASTM D 1785 Schedule 40 PVC*)

Minimum pipeline depth of bury specified:

(For example, *No less than 48 inches from finished grade*)

Pipeline hydrostatic pressure testing specification:

(For example, *APWA/WSDOT (2012) Section 7-11 ... minimum 200 psi*)

Pipeline disinfection specification:

(For example, *APWA/WSDOT (2012) Section 7-11*)

Private property easements required?

☐ Required (Design drawings must identify the location and dimension of these easements)

☐ Not required

6.1 Service meters

Service meters:

☐ Provided at each connection

☐ Not provided at each connection

6.3 Cross connection control

Are there any existing or proposed cross connections?

☐ Yes (If yes, attach a description of the cross connection and how the cross connection will be controlled or eliminated)

☐ No

6.4 Distribution system detailed drawings and specifications

Attach a copy of the distribution system detail drawings and specifications (See Section 6.10 of the *Lewis County Group B Water System Design Guidelines*).

7.0 Atmospheric Storage Tank

7.1 Determining need for an atmospheric storage tank

If any of the following conditions apply to the design of the new or expanding Group B water system, an atmospheric storage tank must be provided (Check all that apply.):

- ☐ Yes The peak hourly demand is greater than the selected well pump can deliver at the pump “on” setting.
- ☐ Yes The local fire authority requires the Group B water system to provide fire suppression capacity, and the source of supply cannot match the needed fire flow.
- ☐ Yes The location of the Group B water system is subject to the Public Water System Coordination Act, it must provide a minimum fire flow, and the source of supply cannot match the needed fire flow.
- ☐ Yes The engineer wishes to provide standby storage or fire suppression capacity.

Use the space below (or a separate sheet of paper) to show your calculations for sizing the storage tank and establishing the elevation of the tank bottom and tank overflow. See Chapter 7 and Equation 7-4 in the *Lewis County Group B Water System Design Guidelines*.

Operating storage:

Equalizing storage:

Standby storage:

Fire suppression storage:

Dead storage:

7.2 Storage tank detailed drawings and specifications

Attach a copy of the storage tank detail drawings and specifications. (See Section 7.6 of the *Lewis County Group B Water System Design Guidelines*.)

8.0 Booster Pumps

8.1 Booster pump selection

Summarize the following booster pump design information:

Number of booster pumps: _____

Cycle Stop Valve (CSV) incorporated in design:

_____Yes _____No

Variable frequency booster pump drive pump(s) incorporated in design:

_____Yes _____No

Booster Pump 1

<u>Pump Design Parameter</u>	<u>At well pump “on”:</u>	<u>At well pump “off”:</u>
Pressure switch pressure setting	_____ psi	_____ psi
Discharge rate	_____ gpm	_____ gpm
Total Dynamic Head	_____ feet	_____ feet

Attach booster pump catalog information with your design submittal:

- Pump curve (or table showing discharge head and corresponding discharge flow)
- Identify the pump “on” and pump “off” operating points on the pump curve
- Pump manufacturer and pump model number
- Pump horse power

Booster Pump 2 (if applicable)

<u>Pump Design Parameter</u>	<u>At well pump “on”:</u>	<u>At well pump “off”:</u>
Pressure switch pressure setting	_____ psi	_____ psi
Discharge rate	_____ gpm	_____ gpm
Total Dynamic Head	_____ feet	_____ feet

Attach booster pump catalog information with your design submittal:

- Pump curve (or table showing discharge head and corresponding discharge flow)
- Identify the pump “on” and pump “off” operating points on the pump curve
- Pump manufacturer and pump model number
- Pump horse power

8.2 Booster pump station detailed drawings and specifications

Attach a copy of the booster pump station detailed drawings and specifications. (See Sections 5.2, 5.3, and 8.0 of the *Lewis County Group B Water System Design Guidelines*.)

9.0 Primary Contaminant Treatment Design

If treatment for a primary contaminant is required, provide the following information.

Contaminant(s) to be treated: _____

Predesign approval date: _____

Treatment device: _____

Manufacturer's name: _____

Model: _____

Capacity (gpm): _____

Capacity (gpd): _____

Removal efficiency: _____

Concentration in well: _____ mg/l

Expected concentration after treatment: _____ mg/l

Attach a copy of the following information:

- Treatment process and maximum daily treated water production capacity.
- Hydraulic considerations and headloss calculations.
- Manufacturer's catalog information showing the treatment system is appropriate for removing the contaminant, based on the untreated water sample information from the well.
- A complete set of water quality data necessary to assess and confirm the effectiveness of the proposed treatment, based on the unique water quality characteristics of the well to be treated.
- Reporting Form and Emergency Response Plan
- Residual disposal volume, disposal permit(s) (if required), and plan for residual disposal.
- Manufacturer's recommended operations and maintenance procedures.
- A list of all chemicals needed for normal operation and maintenance (if any).
- Materials safety data sheet information on all chemicals needed.
- Manufacturer's recommended field water quality testing (if any).

10.0 Secondary Contaminant Treatment Design

If treatment for a secondary contaminant (such as iron or manganese) is required, provide the following information.

Contaminant(s) to be treated: _____

Treatment device: _____

Manufacturer's name: _____

Model: _____

Capacity (gpm): _____

Capacity (gpd): _____

Removal efficiency: _____

Concentration in well: _____ mg/l

Expected concentration after treatment: _____ mg/l

Attach a copy of the following information:

- Treatment process and maximum daily treated water production capacity.
- Hydraulic considerations and headloss calculations.
- Manufacturer's catalog information showing the treatment system is appropriate for removing the contaminant, based on the untreated water sample information from the well.
- A complete set of water quality data necessary to assess and confirm the effectiveness of the proposed treatment, based on the unique water quality characteristics of the well to be treated.
- Residual disposal volume, disposal permit(s) (if required), and plan for residual disposal.
- Manufacturer's recommended operations and maintenance procedures.
- A list of all chemicals needed for normal operation and maintenance (if any).
- Materials safety data sheet information on all chemicals needed.
- Manufacturer's recommended field water quality testing (if any).

11.0 Financial Viability

11.1 Financial Viability Worksheet

The goal is to establish plans, policies, and procedures that give the system owner(s) the ability to obtain enough funds to cover the total cost of operating and maintaining a safe, reliable water system on a continuing basis. Rates and other revenue should be adequate to cover all anticipated expenses. See Chapter 11 of the *Lewis County Group B Water System Design Guidelines*.

TOTAL EXPENSES	1 st Yr.	2 nd Yr.	3 rd Yr.	4 th Yr.
1. Wages & Benefits (Incl. SMA costs)	\$	\$	\$	\$
2. Electricity & other utilities	\$	\$	\$	\$
3. Chemical & Treatment	\$	\$	\$	\$
4. Monitoring Costs	\$	\$	\$	\$
5. Materials & Supplies	\$	\$	\$	\$
6. Repairs and Parts	\$	\$	\$	\$
7. Emergency Reserve Contribution	\$	\$	\$	\$
8. Asset Replacement Reserve Contribution	\$	\$	\$	\$
9. Principal & Interest Payments (For outstanding loans)	\$	\$	\$	\$
10. Taxes and Assessments	\$	\$	\$	\$
11. Insurance and Misc. Expenses	\$	\$	\$	\$
12. Total Expenses (Add lines 1 to 11)	\$	\$	\$	\$
TOTAL REVENUE FROM SOURCES OTHER THAN WATER RATES				
13. Hook Up and Other User Fees	\$	\$	\$	\$
14. Interest Earned	\$	\$	\$	\$
15. Other Revenue	\$	\$	\$	\$
16. Total Revenue (Add lines 13 to 15)	\$	\$	\$	\$
WATER RATE CALCULATIONS				
17. Remaining Revenue Required (Line 12 minus Line 16)	\$	\$	\$	\$
18. Number of Connections	\$	\$	\$	\$
19. Average Water Rate (Line 17 divided by Line 18)	\$	\$	\$	\$